

CLAIMS

1. (Currently Amended) A communications system for transmitting forward and reverse signals, the communications system comprising:

a plurality of optical nodes including a reverse transmitter, each optical node for receiving reverse analog signals and for providing reverse digital optical signals, each reverse transmitter comprising: a plurality of terminals for providing reverse optical signals, wherein the reverse optical signals are transmitted in an analog format;

a reverse transmitter for receiving the reverse optical signals into a single input port and for providing a combined reverse optical signal in a digital format, the reverse transmitter comprising:

a converter for converting the a reverse optical analog signals signal into the a digital optical signal format;

a carrier-detect circuit coupled to the converter for detecting the presence of a carrier signal in the digital optical signal each reverse optical signal received;

a delay circuit coupled to the converter for delaying the digital optical signal reverse optical signals; and

a switch coupled to the delay circuit and controlled by the carrier-detect circuit,

wherein the reverse transmitter provides the combined reverse digital optical signal in a single wavelength only in the presence of a detected reverse optical carrier signal; and

a reverse receiver coupled to the plurality of optical nodes for receiving the single wavelength digital optical signal.

2. (Canceled)

3. (Currently Amended) The communications system of claim 1 further comprising:

a plurality of reverse transmitters;

a digital network coupled to each of the plurality of optical nodes reverse transmitters for receiving and combining the digital combined reverse optical signal received from each of the plurality of optical nodes reverse transmitter;

a the reverse receiver coupled to the digital network for receiving the combined reverse digital optical signals, and for converting the combined reverse digital optical signals to analog reverse optical signals; and

a headend coupled to the reverse receiver for receiving and processing the analog reverse optical signals,

whereby, due to a burst-mode transmission from each of the plurality of optical nodes ~~reverse transmitters~~, the digital network combines the combined ~~reverse~~ digital optical signals from the plurality of optical nodes ~~reverse transmitters~~ using header identifier information.

4. (Currently Amended) The communications system of claim 3, wherein the communications system is a cable television system that may include both a digital headend and an analog headend for generating and receiving the combined ~~reverse~~ digital optical signals in both the digital and the analog formats.

5. (Currently Amended) The communications system of claim 4, wherein the communications system further includes:

a discriminator circuit coupled to the digital network for analyzing the header identifier information,

wherein dependent upon the header identifier information, the discriminator circuit provides the combined ~~reverse~~ digital optical signals in the digital format to the digital headend and provides the combined ~~reverse~~ analog optical signals in the analog format to the analog headend.

6. (Previously Presented) A communications system for transmitting and receiving optical signals over a communications medium, the communications system comprising:

subscriber equipment for transmitting reverse optical signals;

a plurality of transmitters coupled to at least one of the subscriber equipment for digitizing the reverse optical signals, wherein each of the plurality of transmitters comprising:

a carrier-detect circuit for detecting when reverse optical signals are present within the transmitter;

a delay circuit for delaying the reverse optical signals; and

a switch coupled to the delay circuit and controlled by the carrier-detect circuit,

wherein when the carrier-detect circuit detects a reverse optical signal, the carrier-detect circuit allows the reverse optical signal to be transmitted upstream through the digital network;

a digital network coupled to each of the plurality of transmitters for combining the digital reverse optical signals, wherein the combined digital reverse optical signal has a single wavelength;

a receiver coupled to the digital network for converting the digital optical signals back to the original reverse optical signals; and

a headend coupled to the receiver for processing the reverse optical signals,

wherein each of the transmitters combines the reverse optical signals received from the subscriber equipment into a combined reverse optical signal.

7. (Canceled)

8. (Previously Presented) The communications system of claim 6, wherein digitizing the reverse optical signals is accomplished with an analog-to-digital converter.

9. (Previously Presented) The communications system of claim 6, wherein each of the plurality of transmitters blocks the reverse optical signals and encapsulates the blocks into packets with associated identifier header information for identification within the headend.

10. (Original) The communications system of claim 9, wherein the communications system is a cable television system that may include both a digital headend and an analog headend.

11. (Original) The communications system of claim 10, wherein the communications system further comprises:

a discriminator circuit coupled to the digital network for analyzing the associated identifier header information,

wherein dependent upon the identifier header information, the discriminator circuit provides the packets to one of the digital headend and the analog headend.

12. (Original) The communications system of claim 6, wherein the communications medium is a hybrid fiber coaxial cable.

13. (Original) The communications system of claim 10, wherein a control system is used in connection with both the digital and the analog headends for preventing collision of the reverse signals.

REMARKS

Claims 1, 3-6, and 8-13 are presently pending in the application. Claims 1, 3, 6, 8-9, and 12 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,523,177 ("Brown") in view of U.S. Patent No. 5,893,024 ("Sanders"). Claims 4-5, 10-11, and 13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Brown and Sanders in view of LaJoie (5,850,218).

Applicants respectfully traverse the obviousness rejection based on the cited art because the Examiner has not made a prima facie case of obviousness. There is no prima facie case of obviousness because the combination of the cited references does not result in the claimed invention. Moreover, there is no motivation to combine Sander's teachings of an RF carrier detect circuit, which is located in the home, with Brown's teachings of a digital optical node in order to transmit digital optical signals over a single optical fiber. It is believed, therefore, that claims 1, 3-6, and 8-13 are patentable over the cited art for at least the following reasons.

As mentioned in the previous response to the Office Action dated May 4, 2006 and more clearly presented in amended independent claim 1, the present invention is directed towards an optical node, which includes a *burst-mode digital transmitter* that only transmits reverse signals with the presence of a carrier signal. In other words, the burst-mode digital transmitter does not continuously transmit reverse signals unless a carrier signal is detected. Transmitting reverse signals only in the presence of a carrier signal is advantageous in a communications system because there is no longer a requirement for a one-to-one correlation between a reverse transmitter and a reverse receiver. Specifically, there may be several reverse transmitters that provide reverse signals, which include a carrier signal. A plurality of reverse transmitters is then directly coupled by a distribution network comprising optical fiber, switches, and/or routers to a single reverse receiver that receives the reverse signals from the reverse transmitters. Notably, the communications system no longer requires an equal number of reverse receivers as transmitters and the ingress or noise that is introduced with continuously transmitting signals is greatly diminished in the system.

Brown's reverse transmitters transmit reverse signals at all times regardless of whether or not a carrier signal is present. Specifically, Applicants reject the Examiner's opinion as stated in the Office Action that the carrier-detect circuit is suggested by the operation of the node 400 (where the node includes a reverse transmitter), but not explicitly taught. Applicants respectfully submit that there is no teaching, implication, or motivation in Brown to use a carrier-detect circuit for detecting carrier signals in reverse RF signals. This is because Brown's invention is directed towards the nodes providing a digital optical signal that is subsequently multiplexed and transmitted throughout the optical portion.

Additionally, Brown includes an N-to-one DWDM (dense wave division multiplexer) for receiving the digital optical signal from an N number of reverse transmitters each included in a node. It is

submitted that the DWDM's main purpose is to *multiplex each of the received signals onto a different wavelength* from each of the reverse transmitters in order to transmit the signals over a single optical fiber. Applicants respectfully disagree with the Examiner's opinion that the claimed feature of, 'wherein the reverse transmitter provides the combined reverse optical signal in a single wavelength only in the presence of the detected reverse optical signal' is met by the operation of Brown, col. 4, lines 25-51. Specifically, Brown teaches that a digital optical signal is directly provided to an exclusive input of the DWDM, where the DWDM then multiplexes the N number of digital optical signals onto different wavelengths (not a single wavelength). The present invention, on the other hand, includes a plurality of optical nodes where each transmits digital optical signals in a single, i.e., same, wavelength.

Furthermore, in Brown, a one-to-N DWDM located in the headend *demultiplexes* the reverse signals providing an N number of outputs to an N number of reverse receivers. In contrast, the present invention allows *N number* of reverse transmitters to transmit reverse optical signals over optical fiber in a distribution network that is coupled to *one* reverse receiver. Notably, this is accomplished without the use of a DWDM, *which multiplexes the received reverse signals on a different wavelength*, because the carrier-detect circuit gates the amount of reverse optical signals that are provided to the reverse receiver. This is especially advantageous due to the reduced number of required reverse receivers.

Sanders is directed towards an RF carrier detect circuit that prevents any signals from entering the upstream path unless in the presence of a carrier signal. Applicants respectfully submit that there is no motivation to include or modify Brown's system to include Sanders' carrier-detect circuit. More specifically, a carrier-detect circuit, which is located in the home, presents no advantage to Brown's teachings of digitizing RF signals in order for them to be multiplexed and transmitted on a single optical fiber. There would still be a one-to-one requirement of the reverse transmitters to reverse receivers. Additionally, reverse signals are reduced by Sanders' RF carrier detect circuit; however, ingress signals are present everywhere throughout the RF portion of the communications system and not just generated by the home. Therefore, regardless of the home's RF carrier detect circuit, ingress signals would still be received at Brown's node and subsequently digitized and transmitted further upstream in the optical portion of the communications system. In contrast, the present invention does not allow any reverse signals including ingress signals from the RF portion of the system to be transmitted further than the optical node unless a carrier signal is present.

It is respectfully submitted, therefore, that either alone or in combination, Brown and Sanders do not result in or imply the burst-mode digital transmitter of the present invention. Therefore, in light of the amendments and remarks, it is believed that independent claims 1 and 6 are allowable over the cited art. It is also submitted then that dependent claims 3-5 and 8-13 are also patentable over the cited art.